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Fukunaga

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(54) **RF MODULE AND MODE CONVERTING
STRUCTURE HAVING MAGNETIC FIELD
MATCHING AND PENETRATING
CONDUCTOR PATTERNS**

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(75) Inventor: **Tatsuya Fukunaga**, Tokyo (JP)

(73) Assignee: **TDK Corporation**, Tokyo (JP)

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(58) **Field of Classification Search** **333/21 R,**
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See application file for complete search history.

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Primary Examiner—Benny Lee

(74) *Attorney, Agent, or Firm*—Oliff & Berridge, PLC

(57) **ABSTRACT**

The present invention is directed to enable mode conversion between a TEM mode and another mode to be performed among a plurality of waveguides. An RF module comprises: a microstrip line as a first waveguide for propagating electromagnetic waves in a TEM mode; and a waveguide having a multilayer structure as a second waveguide connected to the first waveguide, for propagating electromagnetic waves in another mode different from the TEM mode. An end of the first waveguide is directly or indirectly connected so as to be conductive to one of ground electrodes of the second waveguide from the direction orthogonal to the stacking direction of the ground electrodes. Since magnetic fields are coupled so that the direction of the magnetic field of the first waveguide and that of the magnetic field of the second waveguide match with each other in the E plane, mode conversion between the TEM mode and another mode to be excellently performed between the waveguides.

9 Claims, 19 Drawing Sheets

